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HARVARD SCHOOL OF PUBLIC HEALTH
Exposure, Epidemiology, and Risk Program

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3 May 2007

Delaware Public Service Commission
861 Silver Lake Boulevard
Cannon Building, Suite 100
Dover, DE 19904

Re: PSC Docket 07-20

Chairwoman McRae and Commissioners:

The evaluation of both the Integrated Resource Plan and the Request for Proposals for new generation has proceeded with only the most cursory consideration of the health impacts of the generation proposals. We urge the Public Service Commission and the agencies considering the IRP choices to consider the health costs and benefits of alternative proposals. Note that the law under which the IRP process is operating called for:

> "In developing the IRP, DP&L may consider the economic and environmental value of … (ii) resources that provide short- or long-term environmental benefits to the citizens of this State (such as renewable resources like wind and solar power)" and "The IRP must investigate all potential opportunities for a more diverse supply at the lowest reasonable cost. " [Electric Utility Retail Customer Supply Act of 2006, Sec 6 c (1)(2)

In our view, the language of this law compels consideration of the health costs, in addition to the non-human environmental costs. Only the latter were considered in the point-based RFP evaluation by the independent consultant. Without such consideration, and without including the best estimate of the monetized health costs, there is no way to know the "lowest reasonable cost" of the alternatives.

The general principle applied is that reductions in power generation emissions, whether due to pollution controls, new clean power production, or conservation, will cause a proportionate decrease in health impacts. Cleaner combustion technologies such as IGCC have health benefits if the power displaced caused more emissions than the new power produced. Here we will address only Delaware's large wind power bid, which seems to have the largest health impact among the IRP alternatives under active consideration.

Since emissions from wind power are close to zero (emissions from wind manufacturing and operations are less than 2% those of coal combustion per MWh), their benefits can be approximated by the health impact of the power displaced. Operation of such a facility

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will immediately reduce exposure to Delaware's citizens, because clean power will virtually always be "dispatched" before power that incurs fuel costs.

Considering the 600 MW size of the project, presumed first dispatch, and the capacity factor determined by the wind regime and expected maintenance schedules (39% CF), the proposed wind park would produce about 17% of power for the state of Delaware. Because there cannot be more power produced than used, that means that an average of 17% of existing plant output associated with Delaware electricity utilization would have to be reduced, with a proportional reduction in the public health impacts.

To provide a sense of scale, the Division of Public Health (DHSS) has estimated that 95 Delaware adults (age 30 and over) die each year from power plant emissions, considering all power plants in the United States. Because the deaths in Delaware are due to emissions from all power plants, not just in Delaware, and because reduced emissions from power plants in Delaware would benefit other populations outside of Delaware, estimates of health benefits cannot be extracted directly from this value.

A more appropriate approach would be to examine the emissions from specific nearby power plants, the ones more likely to be turned down when new clean energy comes on the electric grid. While doing such a calculation formally for Delaware is beyond the scope of this current letter, such an approach has been used for the proposed Cape Wind project off Cape Cod. In that case, two nearby power plants were examined (Salem Harbor and Brayton Point). This estimate is part of the Army Corps of Engineers Environmental Impact Statement (EIS) on this project, and has been thoroughly reviewed by both academic experts and the Federal Agencies in charge of the review of the Cape Wind project. It is based on a model constructed using atmospheric dispersion modeling and evidence from the peer-reviewed epidemiological literature, identical to the approach that could be applied in principle to power plants in and around Delaware.

To give an illustrative calculation of the health benefits of the Delaware wind farm, we begin with the Cape Wind EIS health impact calculation. Cape Wind is a smaller project, with a capacity of 468 MW, and in the assessment was assumed to be displacing nearby fossil fuel power generation similar to the Indian River plant in Delaware. That report also found that the wind would be dispatched first, thereby immediately reducing the output of fossil units and providing immediate health benefit. The Cape Wind health benefit is summarized in the Army Corps of Engineers EIS as follows:

> These calculations indicate the beneficial health effects from the Cape Wind Project that could be realized every year in the New England region include a reduction of approximately 12 premature deaths, 20 cases of bronchitis, 200 emergency room visits, 5,000 asthma attacks, 15,000

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restricted activity days, and 35,000 respiratory symptom days. Cape Wind EIS, Section 5.16.4.3, page 5-270.)

A first-order approximation would say that the impacts of the Delaware wind farms will be proportional to these impacts, adjusting for electricity-generating capacity. If we multiply by the difference in power plant size (600 MW/468 MW = 1.28), the 12 lives saved due to the Cape Wind project converts to about 15 lives saved per year due to the Delaware wind farms. Of note, this includes benefits to both residents of Delaware and of downwind states.

Another adjustment must be made to provide a more accurate value. Rules promulgated by DNREC will be requiring emissions controls on the Indian River Power plant by 2009 or 2010, before the wind plant is constructed. The reductions required are 24% of NOx and 53% of SO_2. In the Massachusetts assessments mentioned above, the vast majority of the health impacts were due to secondarily-formed sulfates associated with SO_2 emissions. Thus, we will here assume that the lower pollution reduces the health benefit of clean energy in Delaware by about 50% after 2010. That is, after 2010, Delaware's fossil power will be cleaner, so we here assume that new wind power will have less additional health benefit. This 50% reduction likely underestimates the benefits of wind power, since multiple other power plants would be influenced by the wind park, and many of them would not be required to make such large emission reductions. The approach we use provides a conservative yet reasonable value.

There are other factors that would indicate that the Cape Wind estimate is an underestimate of the benefits of the wind power bid in Delaware. Selected health effects, such as infant deaths, non-fatal cancers, and health effects of ozone or mercury exposure, are not included in the Cape Wind calculation at all. In addition, studies have found that the health impacts per unit emissions from power plants are greater in Delaware than Massachusetts, all else being equal, in large part because of the greater downwind population density (especially for secondary sulfates, where the impact is spread over a greater downwind distance). Modeling results based on a dispersion model developed by consultants to US EPA indicate that the health impact per unit emissions from the Indian River plant (in DE) associated with SO_2 emissions is more than double that of Salem Harbor or Brayton Point (in MA). Thus, our approximation of health benefits below is likely to be a significant underestimate of the actual health benefits of the Delaware wind park. With the information available, we cannot determine the fraction of these benefits that are in Delaware versus other states.

Based on the foregoing analysis, to provide a first-order approximation of the health benefits of the Delaware proposal, we use the Cape Wind calculations and multiply by

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1.28 for the larger power plant here, and by 0.5 to account for cleaner power by the time the wind park comes on-line. The total scaling is 0.64.

Focusing on premature deaths, this approach would yield an estimate of approximately 8 fewer deaths per year due to the Delaware wind park. Using EPA's standard economic value of statistical life of approximately $6 million, these benefits are on the order of $50 million per year. There would also be proportional improvements in a number of other health outcomes, ranging from respiratory or cardiovascular hospital admissions to asthma attacks to days with restricted activity, as described in the Cape Wind EIS above. Applying the above scaling factor to the findings reported for Cape Wind yields additional benefits of approximately 9 fewer hospital admissions, 3,500 fewer asthma attacks, and 10,000 days with restricted activities (major or minor), among other outcomes. These outcomes have direct and indirect economic consequences as well; using the values from the Cape Wind analysis with a 0.64 scaling factor yields an additional $6 million in benefits per year.

If we multiply the above health benefits over the 25-year life of the project, it will mean that the project will avoid roughly 200 deaths, with a total societal benefit of over $1 billion, along with numerous other health outcomes with a total societal benefit of approximately $150 million. If the health costs were discounted at a 3% social discount rate, that would be a discounted present value of approximately $1 billion. With the inclusion of other health outcomes and given the factors described above that might imply greater benefits per unit emissions reduction in Delaware, the discounted present value of the health benefits of the proposed wind park likely greatly exceeds $1 billion.

Over the 25-year contract term of the project, the State's Independent Consultant estimated that Delmarva ratepayers would pay $493 million additional for the wind power. But, as we have shown, rejecting this bid in order to achieve an apparent $493 million savings in electric costs is not cost-effective because it imposes a cost of at least one billion dollars, and likely more than that, on the population and the health system. This cost was not included in the evaluation by either the Delmarva consultant or the Agency Independent Consultant, neither of whom included public health impacts in their analysis.

These health impact figures apply whether or not the Demand Side Management (DSM) plan in the IRP docket, or the Sustainable Energy Utility (SEU), are implemented, and regardless of the degree to which the DSM and/or SEU are successful. Again this is because wind will be dispatched before fossil power, and will lead to the emissions reductions calculated above, regardless of conservation or any site renewable energy in place. The health benefits are proportional to the size of the wind park, not the size of the contract being offered as part of the RFP process (again, assuming that all the wind

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power output is dispatched). On the other hand, if a smaller contract being offered led to a smaller wind park being built and operated, that would reduce the health benefit. The health impact or benefit is approximately linear with output, so a wind park with half the MWh output would produce only half the health benefit.

While more formal analyses would be required to more precisely determine the public health benefits of alternative generation options, it appears likely that the 600 MW wind park's health benefits alone exceed the consultant's estimate of the additional cost of the power. We recommend that the agencies considering this bid consider these impacts in their overall decisions. To ignore these costs would seem to neither be considering the "economic and environmental value" of the choices, nor achieving "lowest reasonable cost."

Sincerely,

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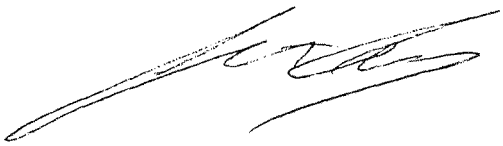

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Note: The authors' affiliations are given as indication of their academic expertise (Kempton, power systems, policy and regulation, and Levy, health impacts of pollution). This statement is not an official indication of institutional positions on this matter.